NIAGARA FALLS NEW YORK

POWER CITY *of the* WORLD

Niagara Falls
and the
Electrical Age

Marvelous Effect of the World's Greatest
Electrical Power Development Upon
a Famous Region and the United
States at Large

BY
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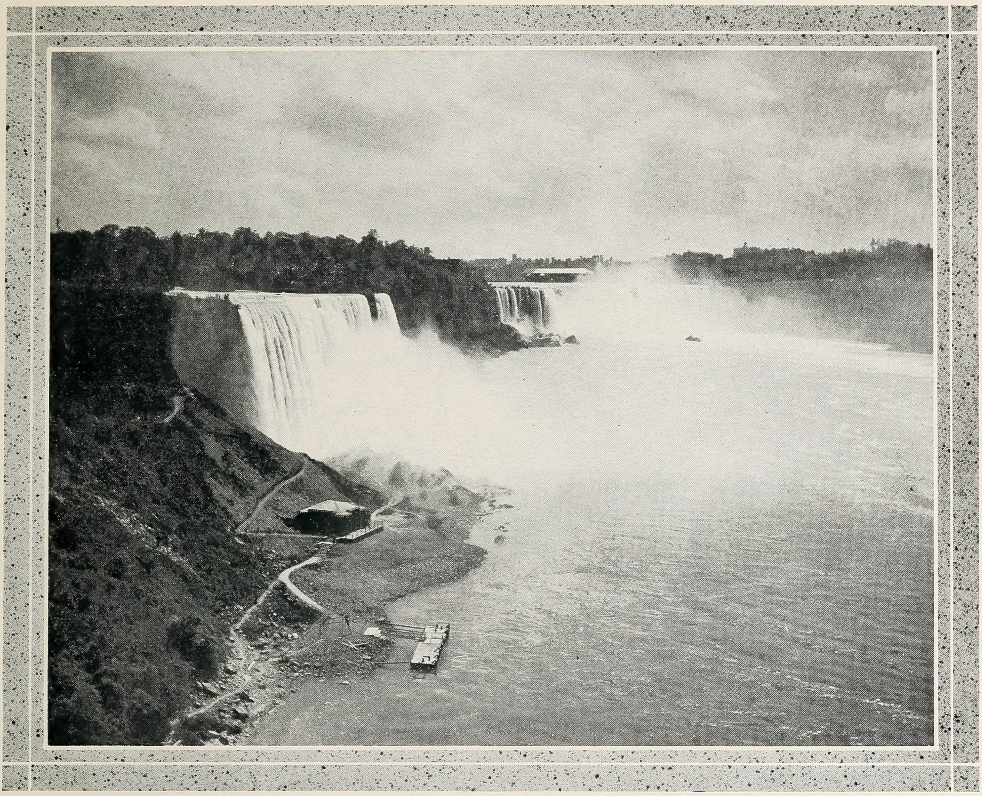
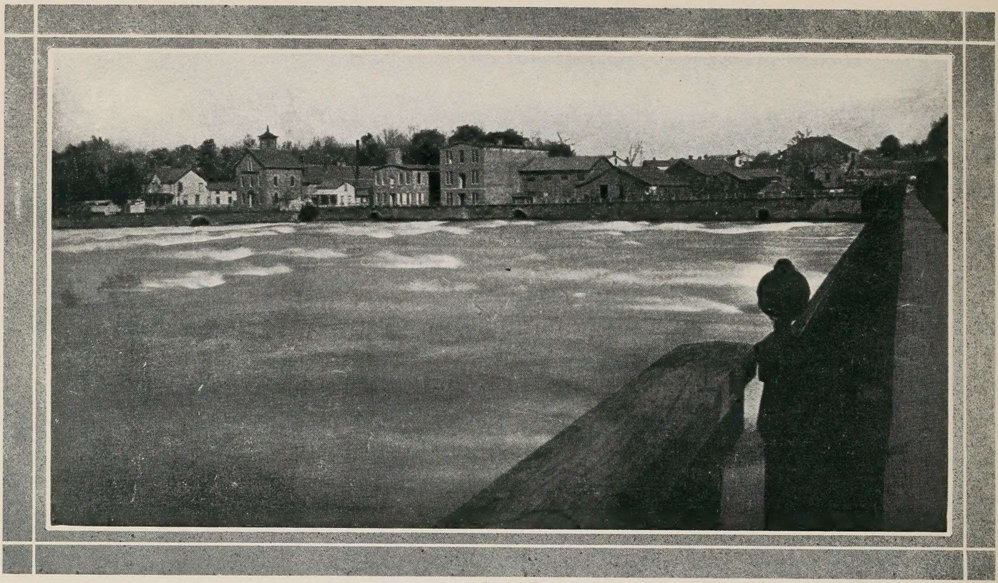


The General View of Both of the Great Cataracts in Summer, Showing Station of the Niagara Reservation, Elevator and Dock of the Maid of the Mist Steamers.

Niagara Falls, Power City of the World

Free Niagara was the forerunner of greater industrial Niagara. That fact may not stand clearly in the mind of every person contemplating the industrial City of Niagara Falls today and the marvelous revolution which the world's first and greatest electrical power development has wrought in many of the activities of life. When the great State of New York, at a large expenditure of its treasure, made Niagara free to all mankind forever, made possible the contemplation of nature's grandest scene by all the inhabitants of the earth without the exaction of toll, and under the best conditions, it builded even wiser than it knew, although there was great interest in the splendid philanthropic project at the time. When the plan had been suggested, it aroused the active, sympathetic interest of the best and greatest men and women of this and other states and of the Dominion of Canada. Many eloquent addresses were made, and hundreds of letters written by the leading people of that time, and the noblest sentiments were expressed, coming from the brightest intellects of the age. From the time when Father Hennepin first viewed the mighty cataracts down the vista of the years that witnessed the settlement and civilization of the American continent, the

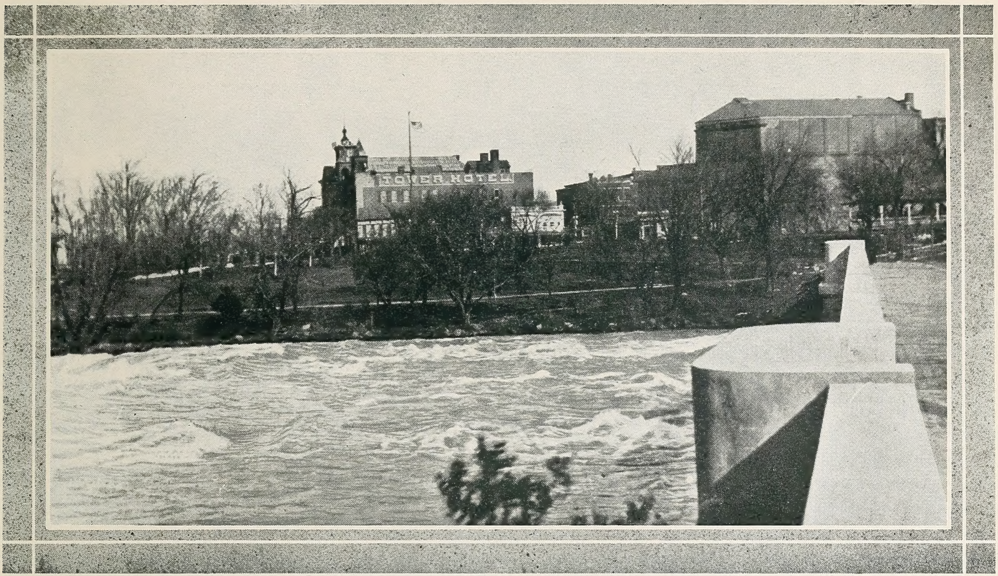


View From the Old Goat Island Bridge, as the American Shore Looked When The State Took Charge.

greatest citizens of every country and every clime, poets and prose writers, statesmen and rulers, the most distinguished in every walk of life had paid court at nature's shrine, and given to history and to literature their best thoughts about the Falls and the most spectacular yet beautiful and potential river on the globe. All of the splendid sentiments accumulated in the years gone by were brought to a climax when the movement was inaugurated to emancipate Niagara and make it the priceless heritage of all human kind as long as the world endures. Then came the project of utility, equally important, and the two admirably balanced, and to well-informed and sensible people, non-conflicting. As the Declaration of Independence written by Thomas Jefferson, afterwards one of our great Presidents of the United States, and the Proclamation of Emancipation, written by Abraham Lincoln, another great President of the United States, are the two greatest documents in our history, not only because of their literary excellence, but principally because of their stupendous interest to humanity, so was the project to make Niagara free of far-reaching import to the world, and as time passes, its significance will become more impressive.

All great movements affecting the public require years of agitation and education before consummation. So it was with the free Niagara project. In fact, when the first legislative bill was taken to a governor of the State of New York, he said that there was no use of spending the people's money to make Niagara free because just as much water would go over the Falls in the then existing conditions.

Again, all great movements require a leader. Scan the pages of American history and you will invariably see that in connection with each, the



View From the Center of the New Goat Island Bridge, as the American Shore Looks Now.

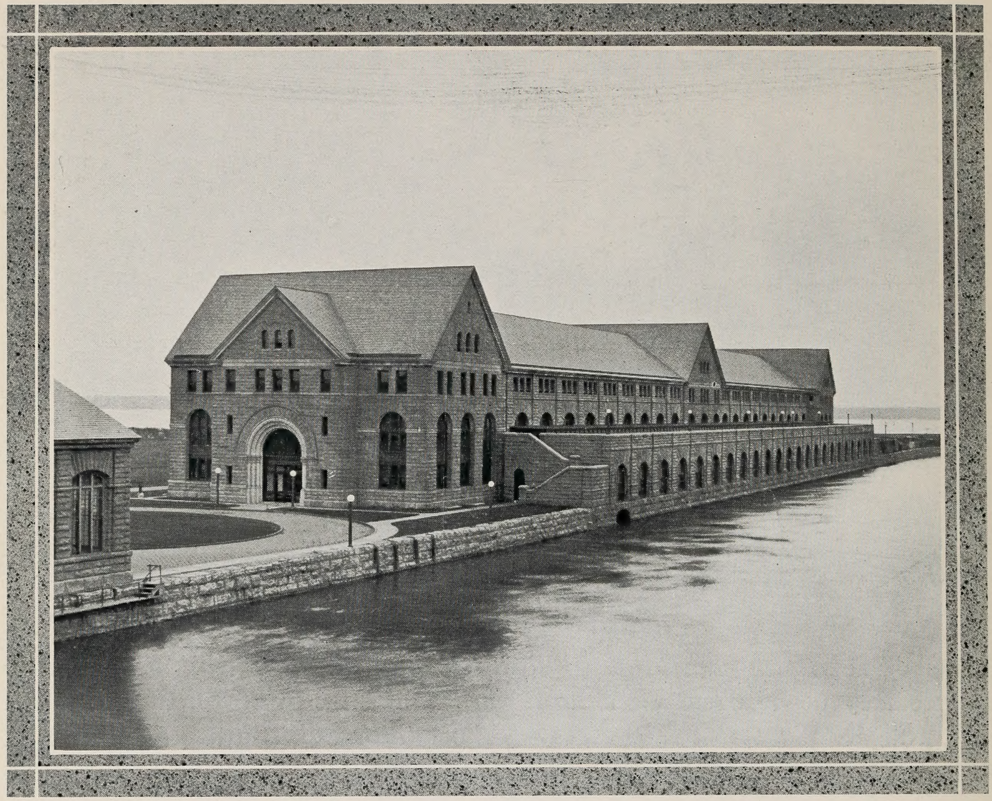
name of some one individual stands out above all others, although many people may do valuable work in co-operation. Again, so it was with the free Niagara project. Inseparably connected with the State Reservation at Niagara is the name of the late Honorable Thomas V. Welch. Not only did Mr. Welch lead the movement extending over several years, that finally resulted in success, but as superintendent for eighteen years up to the time of his death he cleared the shoreline and vicinity of the Falls of the objectionable features, and did the constructive work that has made the state reserve that fringes the great cataracts one of the most beautiful spots in all America. Then came the inauguration of the electrical age.

It has been said that today is the hearse that carries the dream of yesterday to the cemetery. But many of the dreams of yesterday are realities in Niagara Falls today. Dreams are good things in many cases. The man without a vision, without some imagination misses some of the pleasures and profits of life.

We dreamed of the harnessing of Niagara. Today we see the greatest electrical power development in the world.

We dreamed of the brilliant illumination of our streets. Today we have the finest lighted thoroughfares in all America.

We dreamed of the possible manifold uses of Niagara power. Today we have the electric furnace which produces a heat so intense as to stimulate some of the primal forces of nature. It, alone, has made possible the production of artificial gems; carborundum, the hardest of manufactured substances, calcium carbide, which lights more than 200,000 houses, and artificial graphite It produces the greatest quantity of aluminum made in the world,



Exterior of Power House No. 2 of the Niagara Falls Power Company.

and has reduced its price from $12. to 20c. a pound. It has made possible the fixation of atmospheric nitrogen, and revolutionized the steel industry.

The Niagara Gorge was first spanned by a kite string, like a spider spinning his thread. It was followed by a cable upon which passengers rode across in a basket. Then came the suspension bridges, wonders of their time, while now the stately steel arches grace the canyon and form safe passageways for almost countless thousands of people. The process of bridge-building was one of evolution, and each step represented a dream.

The establishment of the New York State Reservation at Niagara and the making of Niagara's scenes free to all mankind forever was a dream of Thomas V. Welch and others, and it has come to a splendid realization.

Twenty-five years ago the first electric railroad car made its appearance, and Niagara Falls was one of the first communities to install an electric railroad system. Less than a quarter of a century ago horse cars traversed our main streets, and two years ago Lincoln Beachey sailed in an aeroplane, with all the gracefulness of a bird, 2000 feet above the great cataracts, and then thrilled thousands of spectators with his daring dash down into the gorge, under the steel arch bridge, and then rose again into the air. Who that rode upon the horse cars on Falls Street twenty-five years ago would not have characterized Beachey's flight as the wildest of dreams?

View of Foyer of Power House No. 2 of the Niagara Falls Power Company.

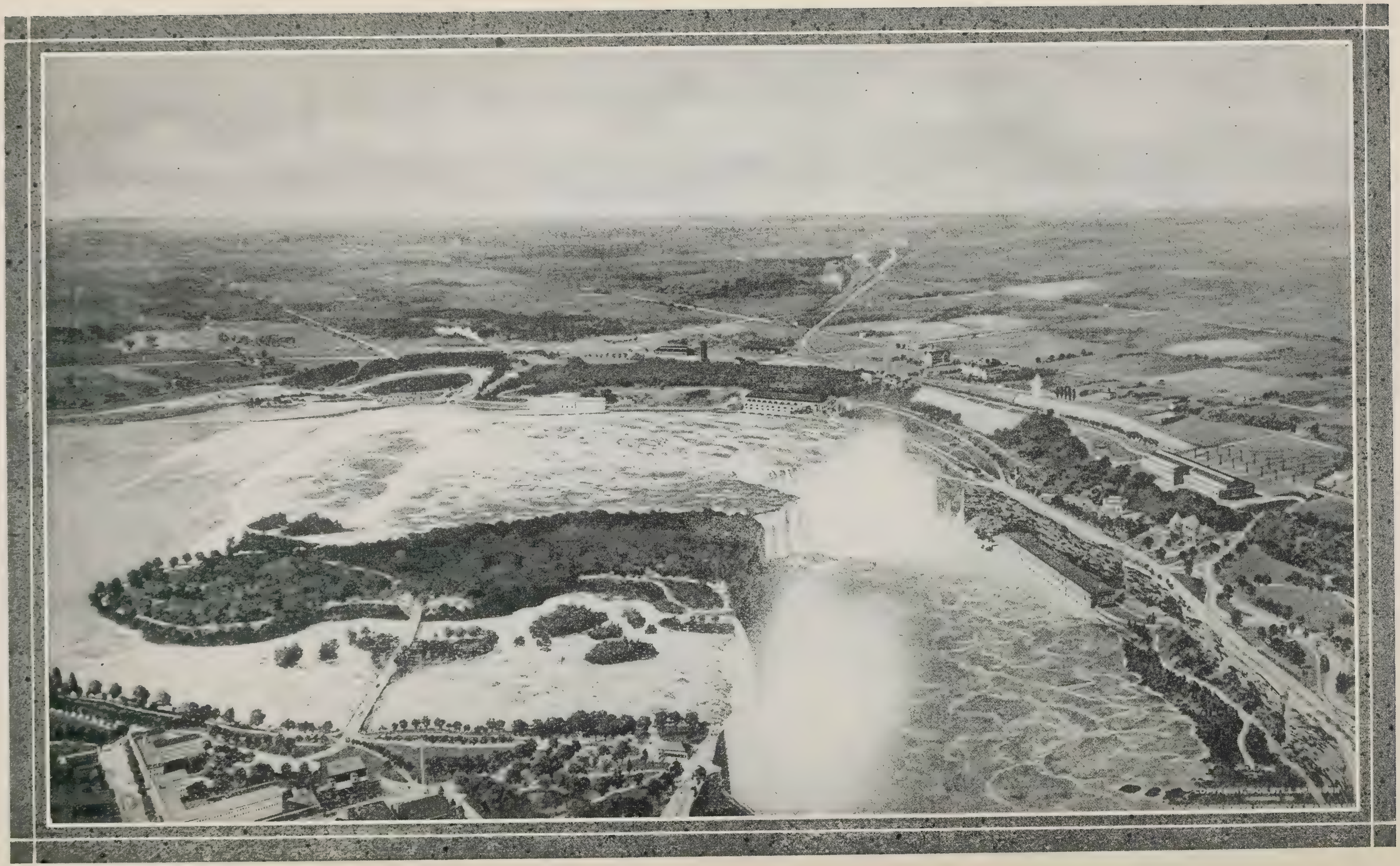
Jacob F. Schoellkopf was thought to be a dreamer when he bought the hydraulic canal for $75,000. What man today does not wish that he could have such a dream?

William B. Rankine, the struggling young lawyer, was a dreamer when he went to New York and secured the money to build the great plant of the Niagara Falls Power Company. That company now has about $25,000,000 invested in electrical development.

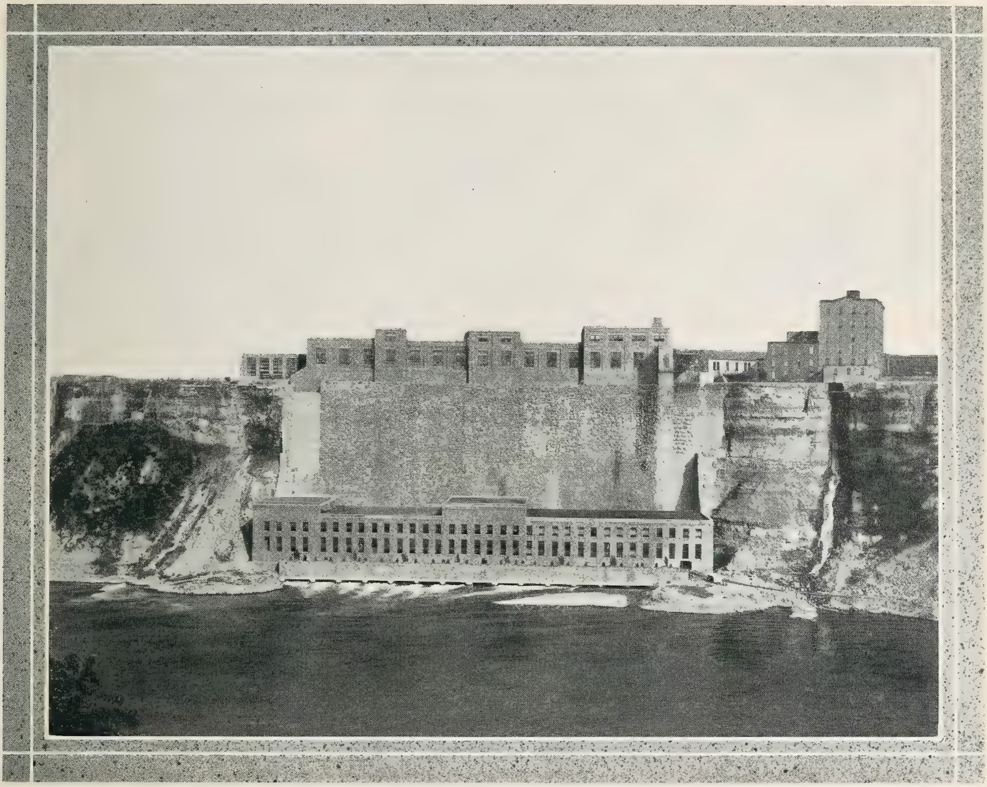
Dr. Edward G. Acheson was a dreamer when he invented carborundum and graphite. The first carborundum was worth $432. per pound. At that price the 13,000,000 pounds of carborundum made last year would be worth over five billion dollars.

Charles M. Hall, the inventor of aluminum, was a dreamer. The original price of aluminum was $12. per pound. The product of the Aluminum Company of America last year was 12,000 tons or 24,000,000 pounds. At $12. per pound this annual product would have been worth $168,000,000. At the present market price of 20c. per pound, it was actually worth nearly $5,000,000.

Captain Charles B. Gaskill was something of a dreamer when he built the flour mill which was the first industry to use power from the hydraulic canal less than forty years ago, but it is estimated that $75,000,000. is now



Bird's Eye View of Niagara Falls, Showing Power Development on the Canadian Side.



View of Power Station, Gate House and Office of the Hydraulic Power Company, Taken From Canadian Side of River.

invested in power development and manufacturing enterprises in Niagara Falls which today give employment to nearly 11,000 people.

Let us make a few comparisons between the Niagara Falls of yesterday and the Niagara Falls of today, the City of Niagara Falls when it was created twenty-two years ago and the City of Niagara Falls in 1914. Then we had 10,000 people; now we have 40,000 people. Then we had three school houses; now we have a dozen. Then we had no paving; now we have forty-eight miles of paving. Then we had a few scattering sewers; now we have 79½ miles of sewering. Then we had an antiquated horse-car line; now we have over 20 miles of electric railroad tracks. Then we had some crude water power; now we are developing over 200,000 electric horse power within our boundaries. The first annual budget of the city was $79,000.; now it is over $700,000. In the early days of the city, building operations were slow and the aggregate small. In the past eight years, the building permits granted in this city total $8,086,035., an average of $1,000,000 per year. Then, if we wanted to talk to anyone, we had to go and see the person; now there are over 5,000 telephones in the city. The comparisons might be continued indefinitely to illustrate not only general progress, but special local progress in less than a quarter of a century.

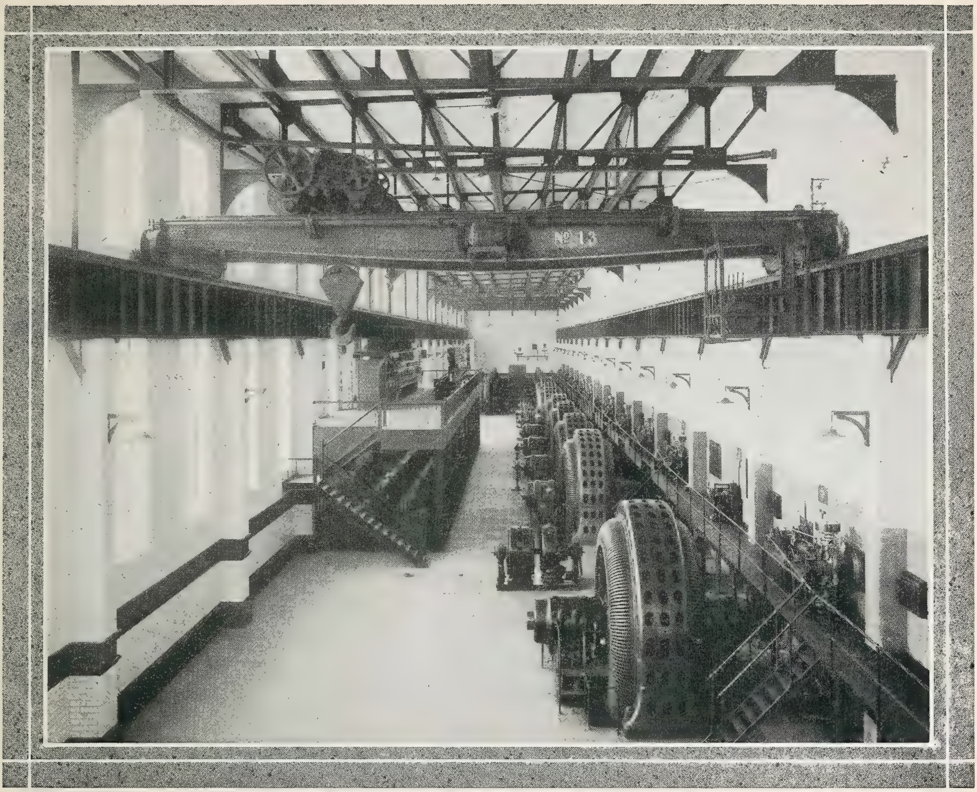
Only recently I visited Saint John's Church in the city of Richmond, Virginia, which antedates the Revolution, and where Patrick Henry made his immortal speech in which he exclaimed: "Give me liberty or give me death." In that speech, which was heard around the world, he also said: "The only lamp that I have to guide my feet is the lamp of experience." The same light guides us today. Standing upon the summit of twenty-two years of city-hood and surveying with justifiable pride our splendid achievements, contemplating the Niagara Falls of yesterday and of today, and what the highest work of creation and the greatest genius of man, working in harmony, have done for us, we can reach only one conclusion and that is that the City of Niagara Falls is destined to take its place among the mighty communities of the earth, that on no fairer, stronger, more useful association of mankind has e'er the sun shone on, assembled at that place described by Father Hennepin in 1679 where "a vast and prodigious cadence of waters falls down after a surprising and astonishing manner insomuch that the universe does not afford its parallel."

Two hundred and sixteen years later, in the light and life of the twentieth century in words that are halting and feeble beside the mighty forces of nature and of man, in the strength that comes from perfect union, I pay my tribute to the Falls of Niagara! Grandest of nature's scenes: Noblest of all the works of creation in earthly spectacles. Millions of people from all over the civilized world have gazed upon the great cataracts with wonderment and awe. By the genius of man, beauty and utility have been united. Sentiment and usefulness march side by side, and delight and serve the human race. The one has inspired reverence and admiration; the other is the vanguard of progress. The one is sublime; the other is unequalled. The one is the greatest inspiration of artists and poets; the other is the origin of man's most superb accomplishment.

The glories of Niagara have reached the uttermost parts of the earth. The mighty ocean and the pleasant land; the mountains that tower above the plains; the other rivers that run down to the sea; Gibraltar, the Matterhorn and the blue expanse of the Mediterranean; all the works of the Omnipotent, whether land or sea, and all that in them is, become of secondary importance when the highest work of creation, man, gazes upon the world's greatest cataracts and fully realizes their potentialities.

By the same token the six great aqueducts and the splendid architecture of ancient Rome; the massive pyramids of Egypt; the man-made glories of ancient Greece; all of the stupendous accomplishments wrought by the brain and hand of man in the century last past are exceeded by the significance of the results of Niagara harnessed. No man can measure what it means to this and succeeding generations. It initiated and chiefly maintains the electrical age.

Ponderous, yet almost noiseless 5.000, 10 000 and 15,000 horse power dynamos convert the swiftly flowing flood of the world's most picturesque river into the magic current that turns night into day, furnishes the force for



View of Generator Room of the Hydraulic Power Company of Niagara Falls, N. Y.

transportation, enters into every form of manufacturing, and has made possible some of our most useful arts.

Who shall say that there was placed in this favored region, peerless Niagara for beauty alone? Niagara's purpose is twofold: Beauty and utility clasp hands, as it were, and move forward to the goal of human happiness: Mankind is uplifted spiritually, and immensely benefitted materially: And Niagara flows on forever!

This is an electrical era. Back in the centuries that are past, we had the stone age, the ice age, etc., but the electrical age is purely the utilization of natural forces by the genius of man. In the twenty-five years last past, probably greater progress has been made in electrical power development than in any other sphere of human activity. This has been done by a scientific conversion of power represented in the flow of water to an invisible current that is applied to almost everything that requires power, light or heat. Twenty-five years ago there were no trolley cars, no street cars propelled by electricity. This silent but potent force was known but little used. In a quarter of a century it has come into general use.

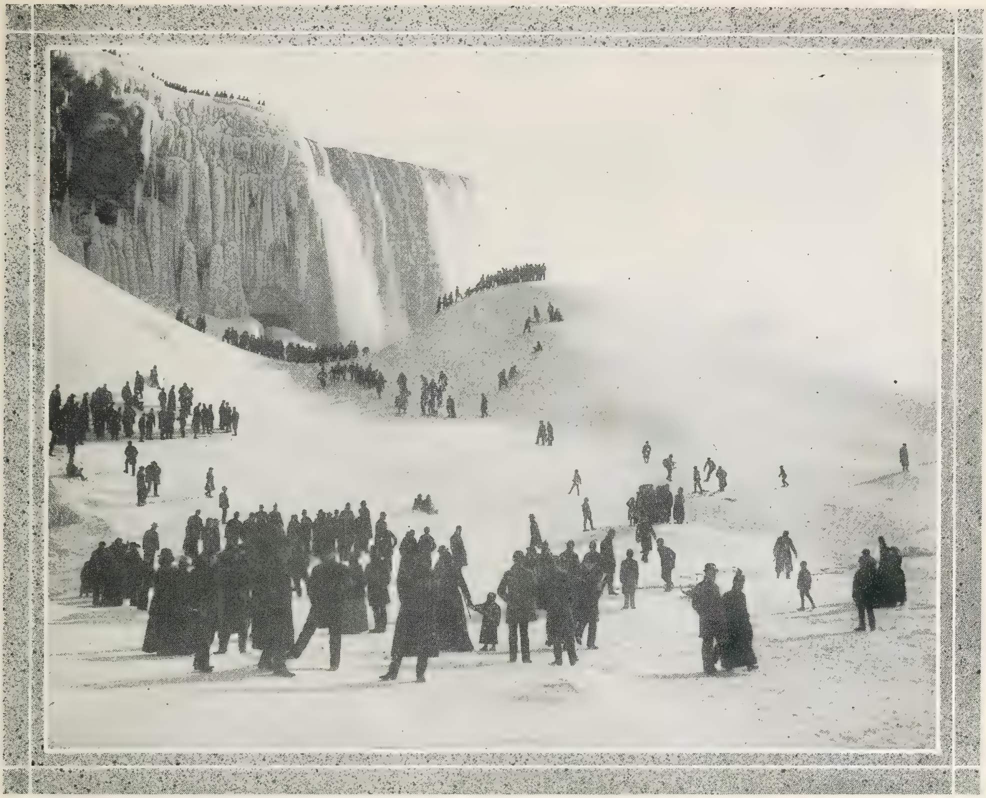
Naturally, the first development of electric power was at the source of the greatest quantity of power anywhere to be found on earth, the Falls of

Niagara. For more than two centuries these cataracts had enjoyed a world-celebrity as a stupendous natural spectacle. So far as is known, the first white man to see them was Father Louis Hennepin, a French missionary, in 1678. Previous to that the native Indian with his "untutored mind" was the only one to contemplate the Falls. In exploring the St. Lawrence River in 1603, Champlain heard of the Falls from the Indians, and referred to them in his published report in a very indefinite way, but he never saw them. He can be credited with the first announcement to the world of the existence of Niagara Falls. After Father Hennepin saw them in 1678, their fame spread, and as civilization advanced, they became to be more and more the wonder and admiration of the world until now it is estimated that over 1,500,000 people come to view nature's greatest handiwork every year. Much has been written and said about Niagara. The language has been searched for extravagant or eloquent words to depict the grandeur of the spectacle. It has been the wonderment of sovereigns and rulers of lands civilized and uncivilized; of persons high in official position; of countries Christian and heathen; of characters of celebrity in art, in literature and in science in almost every language spoken and written. Poets have exhausted their muse, and prose writers have utilized their most grandiloquent phrases to reflect their impressions of bounteous nature's most magnificent gift to mankind.

Francis Lynde Stetson, the eminent New York lawyer and a leading official of the Niagara Falls Power Company, eloquently portrays the Niagara Falls and rapids when he says:

"To souls sensitive to the beautiful and the sublime, the plunging torrent has appealed by the stateliness of its stream, the brilliance of its boisterous rapids, and the deep glassy green of its silent foreboding brink, as well as by its drop into the seemingly infinite depth, from which there comes to him who listens, the note of the welcoming abyss, deeper than the diapason of any organ's pipe. To most, the first impression, and to many the enduring impression is that of awe, in which the subjective mood prevails, and a certain sense of personal danger dominates all other thoughts of this mighty moving flood, pouring resistlessly down through the gorge, which, for itself, it has forced through multiplied strata of rocks of many ages. Danger there certainly is and death in this resistless, remorseless tide has been found and also has been sought by hundreds; but notwithstanding its appalling aspect it is through this very sense of resistless power that the Falls speak to minds of great dignity and self-restraint, and lead them to observe as did Mr. Carter of New York, in his characteristically fine oration at the opening of Niagara Park, that the 'sense which responds to this magnificent motion is the sense of power.' "

That explains why the greatest electrical power development on the globe has been made at Niagara Falls. It is the pioneer and leader of the electrical age. The power producing capacity of the great cataracts is estimated by the most eminent engineers at from five million to seven million horse power. The diversity in the figures is explained by the difference in the flow of the



The American Falls Below Prospect Point in the Grip of Winter, Showing the Ice Mound Which is Sometimes One Hundred Feet High.

river caused at various times by the direction and velocity of the wind or an occasional ice jam in winter. Aside from those elements and the seven-year cycle in which all waters are said to move, there being high and low water periods, there is no perceptible difference in the flow of the river. The potentiality of the Falls is explained by the fact that the Niagara River falls 300 feet in five miles, fifty feet in the upper rapids, 165 feet at the Falls, and 85 feet in the lower river. In its entire length of thirty-six miles, the river falls 326 feet. The average flow of the river is 222,400 cubic feet per second. A flow of one cubic foot per second equals one square mile of water 1.16 inches deep in a thirty-day month. The flow of the Niagara River is furnished by six thousand cubic miles of water from four lakes having ninety thousand square miles of reservoir space. . The drainage area that feeds the Niagara River covers 255,000 square miles, of which 59.4 per cent. lies on the American side of the boundary line. The annual rain and snow that falls over this water shed amounts to nearly thirty-one inches of water. The extreme width of the river is one mile, and the two channels above the Falls are 3800 feet wide. The American Fall is 165 feet high and 1000 feet wide, and the Horseshoe Fall is 159 feet high and 2600 feet in width. The greatest depth of the river just below the Falls is 192 feet. The flow of water over the Falls of Niagara is about 25,000,000 tons an hour or one cubic mile per week.

To show the fluctuation in the flow of the Niagara River, the result of various tests that have been made during a period of more than fifty years may be cited. Inasmuch as the electrical development of power was commenced less than twenty years ago, it will be seen that many of these tests were previous to that period. Joseph William Winthrop Spencer, M. A., Ph. D., F. G. S., an eminent authority on this subject, has given the figures and dates in a comprehensive publication which he issued for the Canadian Government. On October 7th, 1858, the flow was 314,000 cubic feet per second or 7,562,000 horse power. In the month of June, 1862, the flow was 260,000 cubic foot seconds or 6,264,000 horse power. The average flow for the year 1862 was 242,000 cubic foot seconds or 5,854,000 horse power. For the entire period from 1860 to 1890, the average flow was 226,000 cubic foot seconds or 5,444,000 horse power. From 1860 to 1905 it was 204,000 cubic foot seconds or 4,915,000 horse power. . On February 28th, 1902, there was an ice jam and the flow of the river that day was only 158,500 cubic foot seconds or 3,818,000 horse power, while for the whole month of February that year the average flow was 175,000 cubic foot seconds, or 4,216,000 horse power.

The first plan for the electrical development of power at Niagara Falls was made by Thomas Evershed, state engineer of New York, who laid out the state reservation at Niagara, the property which the state acquired in the vicinity of the Falls, removed objectionable structures upon and restored to natural conditions, and who, fifty years before, had done there, work for the state geological survey. It took three years to interest capital in the Niagara Falls Power Company development.. This great work was done chiefly by William B. Rankine, a young Niagara Falls lawyer, who went to New York and interested great financiers like J. Pierpont Morgan, John Jacob Astor, Francis Lynde Stetson, Hamilton McK. Twombly, Edward A. Wickes, Morris K. Jessup, Darius Ogden Mills, Edward D. Adams, Charles F. Clark, Charles Lanier, A. J. Forbes-Leith, Walter Howe, John Crosby Brown, Frederick W. Whitridge, William K. Vanderbilt, George S. Bowdoin, Joseph Larocque of New York, and Charles A. Sweet of Buffalo. Mr. Rankine was the first secretary of the company, and later vice-president and general manager, dying an untimely death, but not until the great project which he promoted was in successful operation.

The power of Niagara was first utilized in 1725 by a primitive sawmill. In 1805 Augustus Porter built a sawmill and blacksmith shop, and in 1807 a grist mill. A raceway from the upper rapids was employed. In 1826 the race or wing dam was extended and other parties used it for various works. DeWitt Clinton, the father of the Erie Canal, and at one time governor of New York, in 1810 wrote in his journal that Niagara Falls is "the best place for hydraulic works in the world." Augustus Porter saw this, and for several years made favorable offers to capitalists. In 1842 he suggested development of power from the river on a larger scale, and, in January, 1847,

Power Station of the Toronto Power Company at Niagara Falls, Ontario.

with Peter Emslie, a civil engineer, published a plan. The first arrangement for development was made with Walter Bryant and Ex-Mayor Caleb S. Woodhull of New York. Horace H. Day, in 1861, completed the hydraulic canal 35 feet wide, eight feet deep and 4400 feet long from the upper river to the top of the high bank of the lower river where there is a fall of 214 feet. The heirs of Augustus Porter gave a right-of-way one hundred feet wide through the village of Niagara Falls and more land at the terminal for the basin. Work was commenced on the canal in 1853. Largely, as a result of this development, the population of Niagara Falls increased from 1951 in 1850 to 6603 in 1860. The first user of power from the hydraulic canal was Captain Charles B. Gaskill who completed a grist mill in 1875. The canal property was acquired in 1877 by Jacob F. Schiellkopf of Buffalo. In 1885 ten thousand horse power was available in the hydraulic canal.

The beginning of the project of the electrical development of power at Niagara Falls was the passage by the New York Legislature of a special charter introduced by Assemblyman Peter A. Porter of Niagara Falls, a descendant of the family that long owned Goat Island and much property immediately adjoining the Falls on the mainland, on March 31st, 1886, granting to the Niagara Falls Power Company the right to develop 120,000 horse power from a tunnel. The projectors were Captain Charles B. Gaskill, the first user of water power from the hydraulic canal, and seven others. It was estimated that 120,000 horse power exceeds the theoretical power at Lawrence, Holyoke, Lowell, Turners Falls, Manchester, Windsor Locks, Bellows Falls and Cohoes, and exceeds the power actually developed at these places and at Augusta, Paterson and Minneapolis. The work of excavating for the tunnel was started October 4th, 1890. The intake canal, one and one-quarter miles above the Falls, is 250 feet wide, 12 feet deep and 1,200 feet long. The wheelpit is 178 feet deep. The tunnel is 7481 feet long and the interior dimensions 21 feet by 18 feet and six inches. It runs about 200 feet below the city of Niagara Falls. The velocity of the water flowing through it is about 20 miles an hour, the slope being six feet in one thousand. In excavating for it, 300,000 tons of rock were taken out. For lining it 16,000,000 bricks were used. The initial installation was for 15,000 horse power. Its generators are of 5,000 and 5,500 horse power in its two power stations at Niagara Falls, New York, and of 10,000 horse power at its plant at Niagara Falls, Ontario.

On August 26th, 1895, Niagara electric power was first delivered, commercially, by the Niagara Falls Power Company, the first customer being the Pittsburgh Reduction Company, which has since changed its name to the Aluminum Company of America, and now has three great plants at Niagara Falls using about 75,000 electrical horse power, this company being undoubtedly the largest power user in the world. There are only twelve aluminum making concerns in the world. This company also has a plant at Shawwinigan Falls and Massina Springs on the Saint Lawrence River, and it is by long odds the largest producer of aluminum. It employs over 1,000 men at Niagara Falls. This great industry was made possible by the electrical harnessing of the Falls of Niagara.

The Hydyraulic Power Company, known locally as the Schoellkopf Company, has widened its canal to 100 feet, and also deepened it. It began an electrical installation soon after the other company did, and now has a great plant with an equal output, and which is constantly extending. This company transmits no power for manufacturing outside of the City of Niagara Falls.

Right here it is interesting to note a new illustration of the potentiality of the Falls of Niagara. It is made by Francis C. Shenehon, principal assistant engineer of the United States Government, and dean of engineering of the University of Minnesota at Minneapolis, who has devoted much time and study to the subject, and who has made an elaborate official report to the National Government, which is published as a senate document. Mr. Shenehon says:

''A volume of 210,000 cubic feet per second with a descent between the 'dead line' and the upper gorge of 220 feet, has a potential of over 5,000,000 horse power. This is the power of 15,000,000 strong draft horses, each limited to an eight hour day. If it takes ten able-bodied men to do the work of one of these draft horses, the work potential in this fall is that of 150,000,000 men, nearly twice our population of men, women and children. The great

Head Works, Inner Forebay, Screen and Gate House of the Ontario Power Company.

companies at the Falls have created, in good faith, power plants to lessen the hardships of human labor, to aid transportation, to illuminate the night hours and to add to the wealth of two nations.''

In this connection it can be stated that each cubic foot of water per second has in it potential energy amounting to 23 horse power. Each cubic foot of water weighs 62½ pounds.

Under the Burton law when in force, and by the war department, the Niagara Falls Power Company is now allowed a maximum diversion of 8600 cubic foot seconds; the Hydraulic Power Company 6500 cubic foot seconds; the Lockport Hydraulic Company 500 cubic foot seconds; the Niagara Falls Power Company is allowed to import from Canada 52500 horse power; the Niagara Falls Electrical Transmission Company is allowed to export 46000 electrical horse power; the Ontario Power Company is allowed to export 60000 electric horse power; the International Railway Company 1500 electric horse power, making a total of 160,000.

The power companies on the Canadian side of the river are allowed to develop power as follows:

Ontario Power Company	180000 H. P.
Canadian Niagara Power Company	125000 H. P.
Electrical Development Company, Ltd.	125000 H. P.
Total	430000 H. P.

Under the agreement of the Canadian Government authorities, one-half of this amount, or 215000 horse power, could be imported into the United States.

The general effect of the electrical power development in the City of Niagara Falls is shown by the increase in the investment in manufacturing enterprises from $8,540,184 in 1900 to $16,915,786 in 1905, and the United States census shows that the total had been increased in 1909 to $28,652,000. The city of Buffalo gets a considerable quantity of Niagara power, and the industrial investment there increased from $126,156,839 in 1900 to $172,115,101 in 1905.

Although there was some manufacturing in Niagara Falls at the time of the beginning of the electrical power development, the industrial element was practically at the minimum as compared to the present time. The summer resort business was the chief feature. The initiation of the electrical power development in 1890 was followed by the consolidation of the villages of Niagara Falls and Suspension Bridge, and the erection of the City of Niagara Falls on March 17th, 1892. Notable work in city building has been accomplished here, including the construction of over 79 miles of sewers at an expense of over $1,400,000., the installation of a first-class water works system by the expenditure of over $1,000,000., the laying of over forty-eight miles of pavement, most of it sheet asphalt and brick, the construction of nine new school houses, including a $150,000 high school building, and the general constructive methods required in a community that has increased in population from about 10,000 in 1890 to 30,445 in 1910, and whose assessed valuation has increased from $7,000,000 in 1892 to $35,175,020. in 1913. The port of Niagara Falls, the United States customs district, in connection with which there are about fifty federal officials, is eighth in importance in the United States, and the volume of business is indicated by the fact that the imports amount to over $50,000,000. annually.

The limitations of space prohibiting reference to each of the industries of Niagara Falls, many of them large and of much importance, it can be said, in a general way, that the electrical power development has made this city the chief seat of the electro-chemical industry, and it has held that rank since this industry was introduced into this country. Out of the total value of electro-chemical products returned by the United States census of 1900, New York State reported $1.836,606 or 89 and eight-tenths per cent.; while at the census of 1905, out of the total of $7,068,246 New York reported substantially all of the product shown for the North Atlantic division of states. As already indicated, Niagara Falls is the center also for the production of aluminum, which has become a strong competitor with copper and other metals. The production of aluminum increased from four million pounds in 1897 to fourteen million three hundred fifty pounds in 1906, and undoubtedly has increased at the same or in greater proportion since. Niagara Falls has. in addition, become an abrasive center, carborundum, alundum, and graphite being produced here in large quantities in three great plants. While these

The Shore of the American Rapids Above the Goat Island Bridge, as it Looked Before The State Removed the Buildings on the Niagara Reservation.

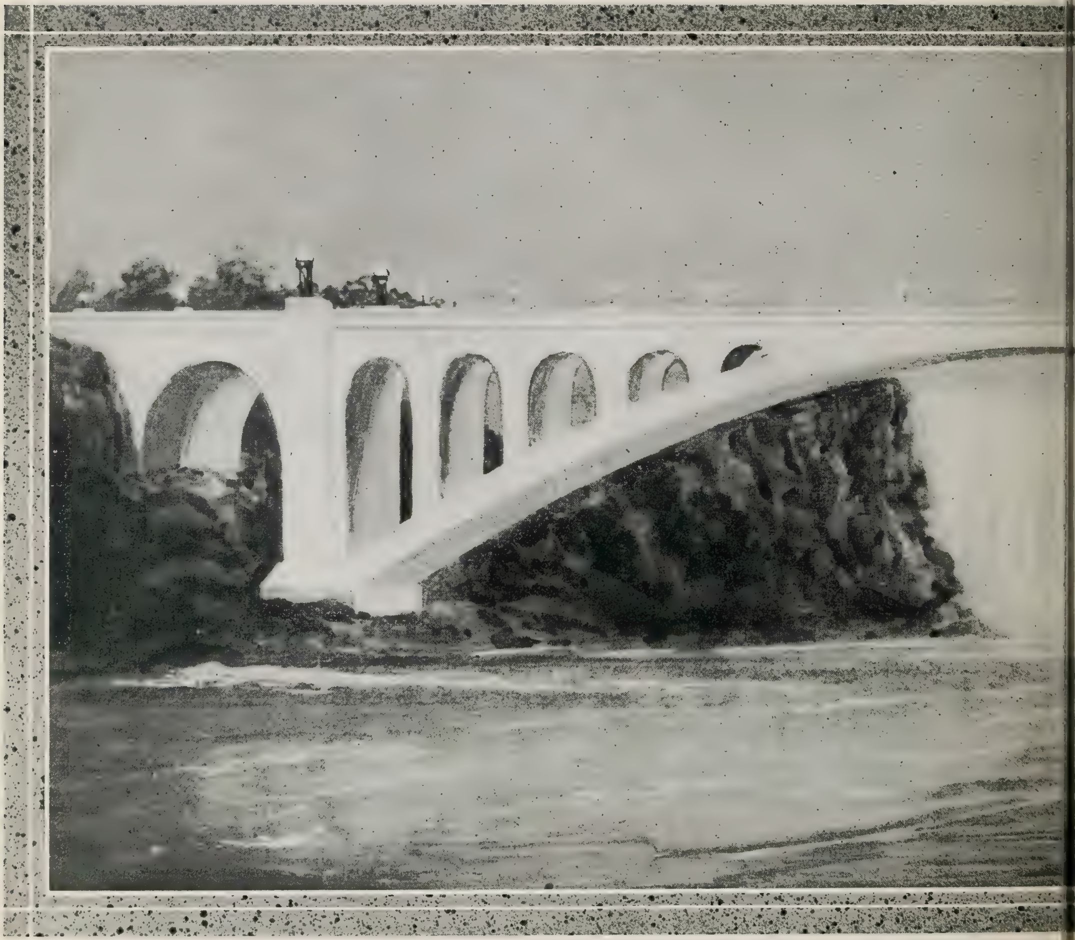
industries are immediately valuable to the city of Niagara Falls, they mean much to the world at large, and have practically affected a revolution in some lines. Of the 260,000 tons of bleaching powder, representing the world's production in 1905, one-half was produced electrolytically, and of the total value of this product in the United States that year of $1,158,064, New York State, principally Niagara Falls, produced $799,521.00 worth. In this connection it is interesting to note that the first United States census to show any electric power in use in this country was that of 1900, when the total was given as 182,562 horse power. Inasmuch as the Niagara electric power was delivered first in 1895, it is certain that most of the total reported in 1900 was at Niagara Falls. The amount had increased in 1905 to 441,592 horse power. It is interesting to note that while the greatest quantity of electrical energy is generated at Niagara Falls, that this is the pioneer development, and that there are several long transmission lines in this vicinity nevertheless, the first great harnessing of the waters of the Niagara River has been followed by other smaller hydro-electric works, and the construction of transmission lines in other parts of the country. These include a plant at Los Angeles, California, with a transmission line 130 miles long; one at San Francisco with a transmission line 100 to 200 miles long; one at Tolo, Oregon, with a transmission line 100 miles long; one at Post Falls, Washington, with a transmission line 110 miles long; and one in the City of Mexico with a transmission line 173 miles long. The Ontario Power Company now transmits about 200 miles. The largest capacity of horse power reported by any plant outside of Niagara Falls is 60,000 at San Francisco, and the same amount at Duluth, Minnesota. Thomas Commerford Martin, expert special agent of the United States census bureau, speaking of the electrical power at Niagara, says that the utilization of "2,000,000 horse power would effect an annual saving of 12,000,000 tons of coal. Upon the basis of 3,000 hours per annum, taking the value of this fuel at $2.50 per ton, the saving effected would amount to $30,000,000. Considering this to represent 40% of the cost of developing annually of 2,000,000 horse power by steam, the total saving is found to be $75,000,000." Proceeding further along this line, William J. Clarke said in 1906: "The total saving, capitalized at 5%, would affix a value to the power available at the Falls of $900,000,000, not including the additional value of the power which would be used for more than 3000 hours per annum. Figures appeal only by comparison. The census returns for 1900 show that the entire value of all farm property in the State of New York was $1,069,723,895. and that the entire capital of the maunfacturing establishments in this state was $1,651,210,220. Giving due consideration to the great scenic value of Niagara Falls, it would be pertinent to ask, if the people of the State and of the nation realized the commercial value of Niagara power, would they be willing to sacrifice, for the entire scenic effect, their share in what is worth practically all the farms of the state, and more than half of the value of the entire manufacturing establishments." The scenic spectacle of the great cataracts is referred to by Francis C. Shenehon as "the splendid extravagance of the power of 5,000,000 horses turned into play as an eternal spectacle."

It is estimated that there is now invested about sixty million of dollars in power development at Niagara Falls. It is estimated that the entire cost of the Catskill Mountain water supply project for New York City will be $161,800,000. The original estimate of cost for the construction of the Panama Canal has been nearly trebled and the cost will finally reach something like $400,000,000. This piece of work runs into far more money but it does not involve the intricate detail of either of the other projects. The Panama Canal is simply a gigantic excavation with the construction of ponderous locks and a dam. Were it not for the slides, no wonderful skill would be required. The Catskill reservoir and aqueduct are far more involved propositions. The conveying of the aqueduct under the Hudson River at Storm King and Breakneck was a wonderful piece of engineering. In order to strike the right kind of rock, the great tube was bored from 1000 to 1400 feet under the river and up on the opposite side, thus creating a great siphon, the force of the water starting 610 feet above the level of the sea in the Ashokan reservoir being sufficient to carry it up a steep grade. As a matter of fact, the force of the water will be so great that no pipe would hold it, and it is necessary to lead it through the solid rock. Sometimes the aqueduct is near the surface and again it is 400 feet below the surface, this deep excavation being made to reach the right kind of rock. If the aqueduct were level, a railroad train could run through it and have plenty of room all around it. Still there were precedents for most of the work done on the water supply project.

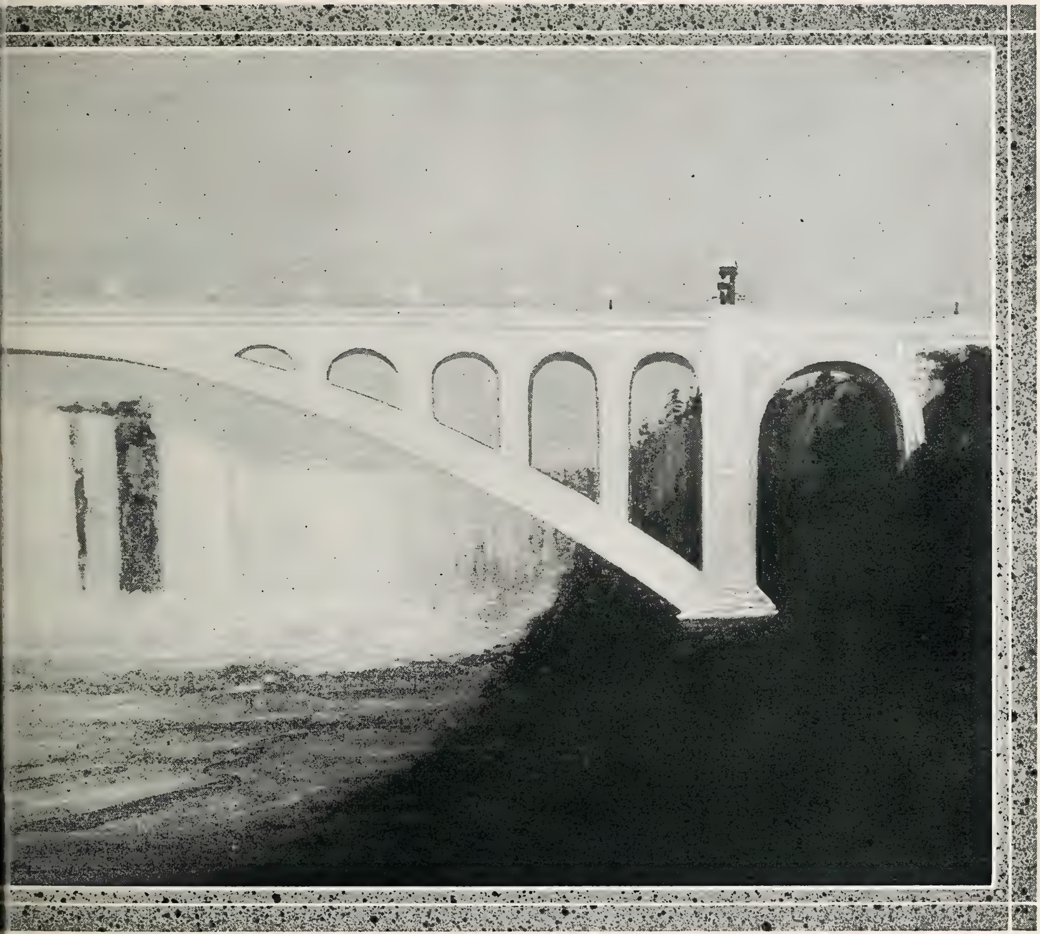
The Shore of the American Rapids Above the Goat Island Bridge, as it Looks Today.

For the Niagara Falls electrical power development there were no precedents. It was an experiment. It required lots of money, like the others, and it also required boundless courage and infinite skill. For the material advancement of mankind, it meant more than either of the others. Water is a requirement of human life, of course, and the Panama Canal will aid our commerce and our prestige upon the high seas, but the subtle current that is created from the flow of the peerless Niagara has revolutionized living conditions, and its products today enter into nearly every manufacturing industry. It has built an industrial center on the site of a summer resort in twenty years, and its impulse is felt from ocean to ocean and across the seas as well. It marked the trail for many similar undertakings none of which can equal it in magnitude.

The power development at Niagara Falls has been of untold value to the nation. It is the biggest thing in the electrical world, and it was the forerunner of all other undertakings of its kind. The brains and the capital that did it blazed the way for all similar undertakings, and because of the volume of the great cataracts, none other can approach it in magnitude. The resultant benefits to mankind can hardly be fully recited. It has been well stated that the effect of the great electrical development has been to lessen the hardships of human labor, to aid transportation, to illuminate the night hours, and to add to the wealth of two nations. It is also stated in the government report, that ''The power houses, for the most part, are architecturally excellent, harmonizing with the scenic surroundings, and the mechanical wonders wrought in solving the engineering problems of the utilization of this great head and volume of water rival as a spectacle the scenic grandeur of the Falls, and add to the attractiveness of the region.'' Since that state-



Proposed Peace Bridge Across the Niagara River Below Niagara Falls
Drawn by T. Kennard Thomso



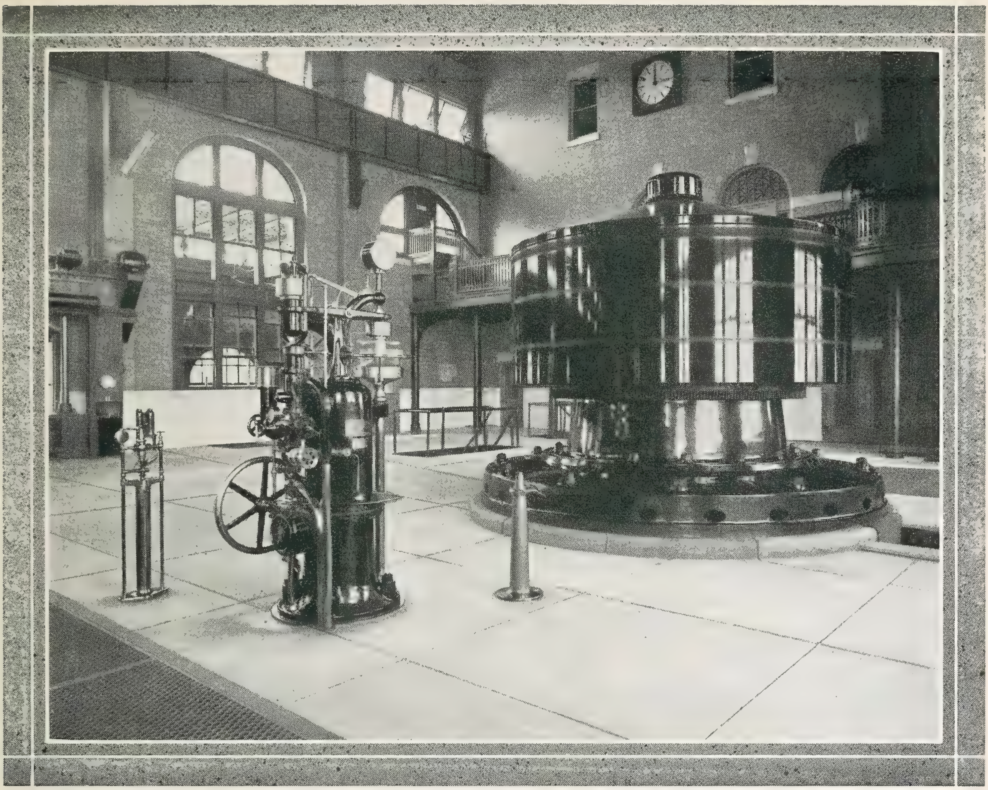
ommemorate 100 Years of Peace Between English Speaking Peoples.
the American Committee.

ment was written into the government records, the Hydraulic Company, at the request of the Taft Scenic Commission, has constructed on the face of the cliff overlooking the lower river, a gigantic rubble masonry wall which covers the penstocks leading from its forebay to its power houses at the water's edge, and harmonizes with its office buildings and other buildings upon its property. This wall, said to be the largest of its kind, is reported to have cost over $100,000. The Niagara Falls Power Company is also carrying out its plan of beautifying by tree planting and otherwise, its lands on the upper river, and later will build a boulevard along the river's edge across its property.

We live in one of the most famous cities of the world, and we are citizens of the imperial state of the greatest nation on the globe. At our thresholds is bounteous nature's most magnificent gift to mankind, the cataracts of the Niagara. Past our doors runs a mighty flood drawn from the world's largest chain of fresh water lakes, and borne in billowy brilliance the 800 miles from Niagara to the sea. Viewed first by the primitive redman and later by the priests of the church, this sublime spectacle has filled with awe, pilgrims from every country and every clime.

In the last quarter of the nineteenth century, filled with greater accomplishments than any other similar period in the world's history, man's genius, superb courage and boundless financial resources wrought the crowning scientific triumph of all time in the electrical harnessing of the most potential river on the globe.

Now in the opening years of the twentieth century, the City of Niagara Falls, in a double sense, occupies a commanding place upon creation's map. Within its borders is the grandest of all nature's scenes, and the fountain head of the electrical age. Four hundred miles away at the gateway of the new world, situated principally upon an island sold by native Americans for $24.00, is the metropolis of the western hemisphere, the most cosmopolitan city in the world, within whose boundaries more wealth is stored than in any similar space, whose buildings rise to the greatest heights, whose inhabitants are transported in the bowels of terra firma, whose commerce is conveyed in ocean greyhounds to the ends of the earth, and whose water supply, transportation, building, financial and general human interest projects involve figures that stagger the imagination of the most optimistic: New York at the portals of the continent. Niagara Falls on the boundary of two nations, standing sentinel on the western border of the premier state of the union. Who shall say them nay? The late Will Carleton wrote:



One 5,000 Horse Power Generator and Governor in Power House No. 2 of the Niagara Falls Power Company.

"I am marching to the sea—
  To my king, the mighty sea;
In his tent he waits for me—
  In his tent with walls of blue,
Decked with flags of brightest hue,
  In his starlit, sunlit tent,
O'er the head in splendor bent.

I have messages in store
  For my king, the mighty sea;
Great Superior's solemn word,
  Huron's answering voice is heard;
Erie's shelving walls of land,
  Clad with wealth and comfort o'er;
Stern Niagara's thunderpour,
  Great Ontario's prosperous strand,
Decked with city pictures grand—
  All send messages by me,
To their king, the mighty sea.

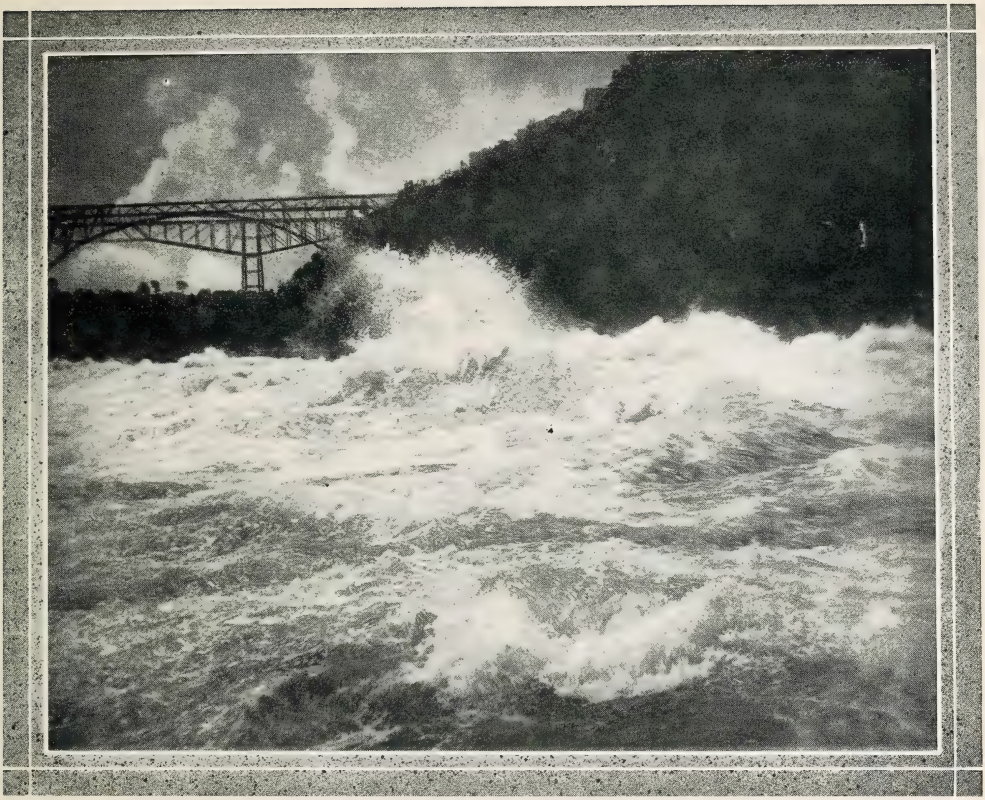
Times, in broad blue lakes I tarry,
  Kept in couches soft and low;
Lulled to sleep as if by fairy,
  Breeze-caresses sweep my brow.
Sun-caresses thrill my soul,
  Shadow-hands my ways control;
In the night's unlaughing glee,
  Stars come out and smile at me;
Zephyrs from the wooded west,
  Pause a while with me to rest.

'Here,' I plead, 'That I might stay
  Many a night and many a day!'
But the cry is 'Onward, On!'
  Never, till my journey's done,
Can I tarry well or long,
  Can I hush my marching song,
I am marching to the sea—
  To my king, the mighty sea;
In his tent he waits for me,
  In his tent with walls of blue,
Decked with flags of brightest hue,
  In his starlit sunlit tent
O'er the head in splendor bent;
  On his calm, majestic breast,
I will lie in changeful rest.''

The Niagara Frontier is a beauty spot world renowned. It is the greatest illustration of the futility of painting the lily and gilding refined gold. To view its surpassing wonders, pilgrims flock from every civilized nation on the globe. In the ages that are past, it was the abode of

> ''The poor Indian whose untutored mind
>   Sees God in clouds, and hears Him in the Wind.''

More than 200 years ago, French missionaries explored it, and Father Hennepin first viewed the Mighty Thunderer, while Father La Salle built the first ship to sail the upper lakes. One hundred years ago it was the chief theatre in a great war, and bloody battles were fought at Fort Erie, Chippawa, Lundy's Lane and Queenston between contending armies speaking the same tongue. Today, the swiftly flowing flood that forms the boundary between the two great nations has been harnessed by the genius of man and the Niagara Frontier is the site of the first and greatest electrical power development on earth, just as the Anglo-Saxon race prepared to celebrate the hundredtdh anniversary of peace between English speaking peoples. Today we furnish a striking illustration of the fact that ''Peace hath her victories no less renowned than war.'' In the reflected glory of a mighty past, we live in a



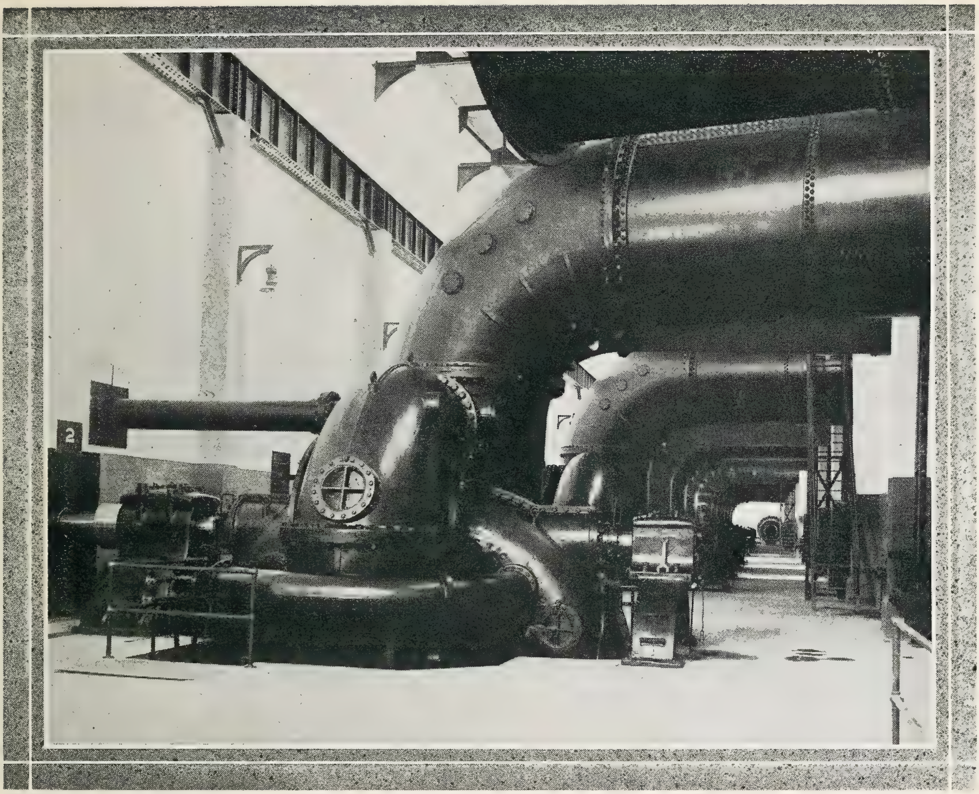
View of the Whirlpool Rapids and Giant Wave Where Captain Webb, the Great Swimmer, Lost His Life, and Showing Steel Arch and Cantilever Railroad Bridges.

splendid present, and move forward to a destiny the magnitude of which no man can measure. What man has done in the conservation of natural resources of the Niagara Frontier, spells achievement, fulfillment, courage, hope, devotion, sacrifice, inspiration, beauty, faith, opportunity, effort, success and compensation.

Now, as to the question of diversion and its effects upon the scenic grandeur of Niagara Falls. The average flow of the Niagara River is 222,400 cubic feet per second; to be conservative, the United States engineers sometimes use 210,000 cubic feet per second as the amount. The variations are caused, largely, by the direction of the wind; ice conditions in winter sometimes make a material difference in the flow for a few hours. The Burton law permitted a total diversion on the American side of the river of 15,600 cubic feet per second, and an importation from Canada of 160,000 horse power. The British-American treaty permits a diversion on the American side of 20,000 cubic feet per second, and it is contended by those most familiar with the situation, that neither the Congress of the United States nor the Legislature of the State of New York should impose any restrictions less than those imposed by the international treaty which was negotiated after a careful investigation by the International Waterways Commission, a body appointed under a statute of the United States to confer with a similar body appointed under a statute of Canada, to make recommendations with reference to the control and government of the waters of the great lakes and the valley of the Saint Lawrence with reference to the question of the amount of water which could be withdrawn on the American and Canadian side of the Niagara River without material injury to the cataracts as one of the great natural beauties of the world. When William H. Taft was Secretary of War, it was his duty to deal with this matter, and he came to Niagara Falls, held a hearing at which all the parties interested were represented, and he announced that he had reached the conclusion that with a diversion of 15,600 cubic feet on the American side, and the transmission of 160,000 horse power from the Canadian side, the scenic grandeur of the Falls was not affected substantially or perceptibly to the eye.

And the passage of the years has confirmed this conclusion, although the agitators and dispensers of hysterics living at a distance and depending upon hearsay evidence, when they are sincere at all, continue to assert to the contrary. Lifelong residents of this locality know that there is no change in the appearance of the American Fall, and that the baring of some rocks on the outer edge of the Horseshoe Fall is caused by the annual recession at the apex. At any rate, the British-American treaty has been ratified, and that provides that 36,000 cubic feet of water per second can be diverted there as against 20,000 cubic feet of water on the American side. The United States has consented to such a diversion and no law of Congress can prevent it up to the limits of the treaty. The placing of a ban upon the importation of this power into the United States simply operates to force manufacturing industries to go to Canada that would otherwise locate in the United States.

Since the enactment of the Burton law in June, 1906, United States engineers have made exhaustive examinations of Niagara River, and have made elaborate reports to the War Department which have been transmitted to the Congress by the President. The investigations undertaken by the United States Lake Survey engineers related to the effects of the diversion upon the level of Lake Erie; the effects upon the navigable capacity of the river in this reach; the effect upon the river as a boundary stream; the effect upon the scenic grandeur of Niagara Falls and of the rapids of the Niagara River, and the volumes of the diversions from the river or its tributaries in the State of New York at present in force as bearing on the compliance of the power companies with the terms of their revocable permits. From the great mass of material in these government reports can be quoted this statement: "It is only fair to state, because of some erroneous views concerning the alleged injury already wrought on the Falls by diversion, that during the decade from 1899 to 1908, for the months of June to October, inclusive, the Falls have had a fullness of volume and consequent grandeur barely less than that of the prior decade, 1889 to 1898; and this is because the surplus waters actually tributary to the Niagara River, have been a little greater in



View of Water Wheel Room of the Hydraulic Company at Niagara Falls, N. Y. Contains 13 Units of 10,000 Horse Power Each.

the latter decade than in the preceeding, offsetting all the diversions above the head of the river and practically compensating those at the Falls.'' And it is further stated that in the latter decade, the American Fall has had a greater flow than in the former decade.

It seems also proper to point out that the navigable capacity of the Niagara River is dependent upon its depth and velocity which can be measured; that its integrity and proper volume are questions of fact, but that the scenic grandeur of Niagara Falls appears to be dependent upon opinion and sentiment, and that it is absurd to attempt to demonstrate by physical measurements the effects of any diversion. It was the judgment of the International Waterways Commission and the men who framed the British-American treaty, that an even greater diversion would not be injurious. It was the opinion of the Congress of the United States and Secretary Taft that the present diversion would not be injurious. A test made by engineers of the United States Lake Survey corps proved that the diversion is not perceptible, and the people who see Niagara River daily say that no effect on its flow is perceptible as the result of power development.

An accurate guage of the commercial importance of the Niagara Frontier outside of Buffalo is the business of the United States custom house at

Niagara Falls, which is the eighth port in importance in the United States. In one year the total number of passengers arriving at that port from foreign territory was 1,100,000. The estimated number of pieces of hand baggage stamped for transportation through Canada was 150,000. The total number of cars of freight inspected and sealed for transportation through Canada was 252,088. The total number of entries of merchandise was 36,081. The amount of the duty collected was $525,525.39. The total value of all merchandise imported and exported was $50,938,236. of which the exports amounted to $31,528,138. In this connection, it might be stated that about 1,250,000 freight cars are annually handled in the joint freight yards in Niagara Falls. This is a tremendous traffic, and the figures given demonstrate that Niagara Falls is the literal gateway between east and west.

Our present greatness was largely the result of the century-old vision and foundation-laying of Augustus Porter and the latter day splendid fulfillment led by William B. Rankine and Arthur Schoellkopf. These men of talent and of energy, who guided the thunder waters to the realization of man's great purpose, and who have prematurely recruited the ranks of the unreplying dead, were as the pathfinders of a continent marking the trail across arid plains and scaling the rugged mountainsides 10.000 feet or more. In the great work which these men did, they exemplified these lines of the old gospel hymn:

"Sowing in the sunshine, sowing in the shadow,
Fearing neither clouds nor winter's chilling breeze;
By and by the harvest, and the labor ended,
We shall come rejoicing, bringing in the sheaves."

And we who remain need not hesitate to lay our hands to the task that lies before us for Eliot has said that "The blessed work of helping the world forward happily does not wait to be done by perfect men." And Spurgeon said that "Many men owe the grandeur of their lives to their tremendous difficulties." Many of us are attached by tender ties to village days, but the great majority of our citizenship is chiefly concerned with the industrious and prosperous present and the expanding future which spreads its brilliant vista before us.

Twenty-two years a city! And these were years full of accomplishment. Within this brief span, summer resort villages have become a great manufacturing center and yet nature's shrine is unimpaired. First, the dense forest and the primitive savage, then the crude early settlement and devastating war, later, the noble work of the sturdy pioneer, now, the massive power houses reared of native stone within whose walls giant yet almost silent 5000, 10,000 and 12.000 horse power dynamos whirl ceaselessly converting Niagara's flood, which has poured down for centuries unutilized, into that subtle force that turns countless wheels of industry, enters largely into transportation, changes darkness into light, and is a potent element in almost every sphere of human activity.

Distributing Station of the Ontario Power Company.

In conclusion, it may be stated that the electrical power development at Niagara Falls has made this city one of diversified manufacturing industries, so diversified, in fact, that adverse results in one or two lines could never seriously affect the stability of this city as a manufacturing center. This first and greatest of all electrical power developments has also drawn the attention of the entire country to Niagara Falls as a manufacturing point, in addition to being a great scenic resort. The diversity of our manufacturing business is shown by the following list of articles made here:

Aluminum, abrasives, salesbooks, flour and feed, graphite, wall paper, iron castings, electrodes, brick, brass castings, barrels, paper boxes, chemicals, print paper, beer, silver-plated ware, frogs, switches, switch stands, shredded wheat biscuits and triscuits, toilet powder, calcium carbide, storage batteries for lighting and heating railway coaches and electric starters for automobiles, chewing gum ,corsets, linen goods, warm air furnaces, hooks, eyes and fasteners, titanium alloy for steel rails, wire stitchers, electric switches, lightning arresters and printing presses, pea hullers, metal stamped goods, knit goods, pulp, boilers, hair cloth, coated paper, searchlights, leather tire goods. carbon, ice, electricity, gas, weather strips, lastic air for automobile tires.

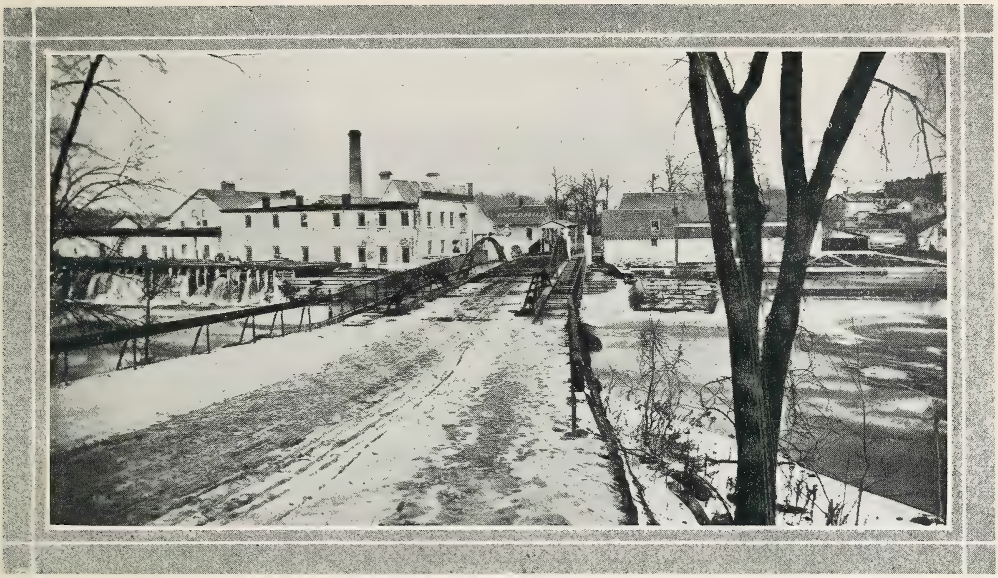
The extent to which some of these articles and products are made is shown in the total annual product in a few instances:

Shredded wheat biscuit and triscuit, 1,113,273 cases, which, at 432 biscuits in a case, means 497,933,936 separate articles of food, and estimating the biscuits at 4 inches in length each, if they were laid end to end, they would reach the 25,000 miles around the earth and make a good start around again; 7000 tons of wall paper; 15,969,416 pounds of graphite; 648,000 barrels of flour; 5,067,000 bricks; 200,000 gross of silver-plated ware; 6870 tons or 13.740,000 pounds of carborundum; 23,000,000 pounds of Norton abrasives; 300.000 pounds chocolate candy; 1000 tons of electrodes; 12,000 tons or 24,000,000 pounds of aluminum; 7,000,000 paper boxes; 5500 tons of roofing paper; product of three chemical concerns, 61,600 tons; 65,000 tons of news print paper; 65,000 barrels of beer; 250,000 boxes of toilet powder; 480,000 pounds of brass castings; 4800 tons of iron castings; 30,000,000 counter sales books and 2,000,000 print and plain rolls used with autographic registers and manigraphs; and from two to three million yards of haircloth.

While it is impracticable to give the exact figures, in fact it would not be possible, nevertheless a good idea of the aggregate value of the manufactured products of the City of Niagara Falls may be obtained from the fact that thirty manufacturing concerns have reported the value of their product for the year 1913 to the City Industrial Agent, and the same totals the handsome sum of $29,822,132.95, or an average of nearly $1,000,000. each. With some knowledge of the business of the concerns not included in the above figures, it is safe to make the statement that the leading manufacturing concerns of Niagara Falls annually make products aggregating in value from $35,000,000. to $40,000,000. Electrical current, which is our greatest product, is not included in this estimate. Neither are ice, gas and other commodities that are in general use in every city, and usually home-made articles like bread, ice cream, etc.

Detroit, Michigan, is the center for automobile manufacturing; Grand Rapids, Michigan, and Jamestown, New York, for furniture making; Dunkirk, New York, for locomotive building; Schenectady, New York, for electrical apparatus and locomotives; New England cities for shoes, and other cities for one or two commodities, but the City of Niagara Falls, while particularly noted for the product of the electrical furnace, is a city of diversified industries, and has over fifty kinds of manufacturing which insures its being a permanent, industrial city of rapidly growing proportions.

Electrical power development, initiated and chiefly centered in Niagara Falls, has a new classification in manufacturing, of far reaching consequence relating to chemicals produced by the heat of electricity. The United States Census Bureau first treated this subject in 1900. The first electric power developed at Niagara Falls was delivered in 1895, and five years later, the progress in this line had been so great that there was much to say upon the subject. In the comparatively short time which has elapsed since electricity was first practically employed in the manufacturing of the chemicals, many new and advantageous processes have been found, which have resulted, not only in the more economical production of substances already obtained by other methods, but also in the addition of some hitherto un-



View From Goat Island Looking Toward the American Shore Before the Establishment of the Niagara Reservation, July 15th, 1885, Showing Paper Mill on Bath, Now Green Island.

known to commerce. With the constant progress of discovery and invention in this field, this industry has shown an ever widening range in the substances produced, as well as a steady increase in the quantity and value of its products. Among these products made at Niagara Falls are aluminum, graphite, carbon, carborundum, alundum, titanium alloy, calcium carbide, bleaching powder, and various chemicals with technical names that do not convey much information to the general public. The State of New York has ranked first, at each United States census, in the number of establishments engaged in this industry, reporting two-thirds of the total number returned in 1905. The great supremacy of the State of New York is stated to be in consequence of the fact that the electro-chemical industry has depended, primarily, for its success upon cheap and abundant supplies of water power such as are found at Niagara Falls. Inasmuch as the greatest water power in the world is here, the fact is apparent that Niagara Falls dominates the electro-chemical industry. In fact, the United States Census Bureau states that Niagara Falls, New York, is the chief seat of the electro-chemical industry, and that it has held this rank since the industry was introduced into this country.

As already stated, the first electric power delivered by the Niagara Falls Power Company, was furnished to what was then the Pittsburgh Reduction Company, and is now the Aluminum Company of America. This was in 1895. In 1897 the production of four million pounds of aluminum was reported. It was then worth 35c. per pound, and the total value of the product that year was accordingly, $1,400,000. The product steadily increased up to 1906, when it was 14,350,000 pounds. The price varied somewhat, it being 29c. per pound in 1903, but increased to 36c. in 1906, when the total value of the product was $5,166,000. Aluminum was originally worth $12.00 per pound. Since 1906 the price has gone down from 36c. per pound to 20c. per pound, and, therefore, while the Aluminum Company of America alone produced about twenty-four million pounds last year, its total value was less than the value of the 14,350,000 pounds in 1906. As a strong competitor of copper, aluminum is now an important factor. The Aluminum Company of America owns large bauxite deposits in the states of Georgia, Alabama and Arkansas, but the most of its ore is reported to come from Saline County, Arkansas. It has done a large amount of stripping and development work at its mines at Bauxite, Arkansas, where it has a crushing, grinding and drying plant, and has built a railroad called the Bauxite and Northern connecting all of its mines in that region with the Chicago, Rock Island and Pacific Railroad, and the Missouri-Pacific and Iron Mountain system. As stated elsewhere, the company has three great plants at Niagara Falls where the pig aluminum is made, and the sheet aluminum rolled. It is understood to take about seventy-five thousand electrical horse power here, and reputed to be the largest power user in the world. Its sheet rolling mill here, is one of the largest and most complete in America. Beside its Niagara Falls mills, the company has reduction plants at Massena, New York, and Shawenegan Falls, Quebec, Canada. At the latter place, it has quadrupled its plant. The carbons manufactured by this company are baked in electrically heated furnaces patented by Charles M. Hall of Niagara Falls, New York, the vice-president of the company. Aluminum is now used in the manufacture of many articles including household utensils, electric power cables, etc.

Alundum is another product of the electrical power development at Niagara Falls, although its manufacture was not commenced here. Alundum was first made by the Norton Emory Wheel Company, of Worcester, Massachusetts, in 1904. Later, the company built a plant at Niagara Falls, and installed eleven electric furnaces capable of producing three tons of alundum in twenty-four hours. Alundum is formed in the electric furnaces from bauxite, and is used as an abrasive. The production in 1904 was 4,020,000 pounds, valued at $281,400. In 1906 the production had increased to 4,331,233 pounds valued at $303,186, and in 1913 the production was 23,000,000 pounds valued at $1,200,000. Briefly, the process of making alundum consists in taking the mineral, bauxite, purifying it, and melting it in an electric furnace into a large homogeneous mass. Upon cooling, this molten fluid solidifies and crystalizes in solid masses of alundum, of great purity and uniformity. The bauxite is heated in large preliminary furnaces to drive off the combined moisture content, and is then melted directly in electric furnaces of special design. The temperature at which the bauxite melts, is estimated at between six and seven thousand degrees Fahrenheit.

View From Same Vantage Point on Goat Island Showing Conditions as They are Today.

Carborundum is another one of the leading manufactured products in Niagara Falls, as the result of the electrical power development and the electric furnace. The inventor is Dr. Edward G. Acheson. It is made of salt, sand, coke and sawdust, and is chiefly an abrasive, but is also used in the mechanical, chemical and metallurgical fields. It is the hardest manufactured thing. In the marble industry it is of much value, being used in countersinking and polishing. In beveling glass, one operator can bevel 6500 feet per day with ten pounds of carborundum grains. In the woodworking trade, it displaces Garnet paper, and in the hat trade it is in competition with flint paper. It is also applied to stair treads, carriage treads and horseshoes, and used in the construction of cement pavements and sidewalks. Other uses are in firebrick and in the manufacturing of resistance rods for lightning arresters. A carbon, wireless detector for telegraph companies is another of the many uses of this product. The original price of carborundum was $432. per pound. The production in 1913 was 13.740,000 pounds. At the initial price, that amount would be worth $5,729,580,000. Carborundum illustrates the general and widespread utility of that which Niagara electric power has alone produced, and it can be cited that modern abrasives are used in the sharpening of knives and saws in the lumber industry; in the manufacture of porcelain, cut glass, agate-ware, fine lenses, tumblers, boots and shoes, car-wheels and steel rails; wagons, plows, harvesters and other farm implements; radiators, tools of every character; phonograph and graphophone needles; paper pulp; fountain pens and combs; surgical instruments; typewriter rolls; leather goods; german silver, rubber, celluloid and mother-of-pearl articles; in the polishing of granite, marble onyx and terrazzo; in the hulling of rice; in the grinding of rollers for the manufacture of the best qualities of chocolate and cereal food; in the tanning trades; in smoothing concrete and cleaning cement; in the finishing of automobile tires, and for numerous other purposes.

Another big industry in Niagara Falls, as the result of electrical development, is the production of calcium-carbide. In fact, the Union Carbide Company, which has a great plant here and another one in Sault Ste. Marie, controls the production of calcium-carbide of the United States. It is stated that over 200,000 houses are lighted with acetylene gas which is produced from calcium-carbide. It is understood that the Union Carbide Company is the second largest user of electrical power in the world, the quantity of current which it takes at Niagara Falls, being stated to be 60,000 horse power.

Dr. Edward G. Acheson is the inventor of another leading manufactured product at Niagara Falls, which is graphite, the only man-made graphite in the world, being superior to the natural product that contains some impurities. Graphite is made from anthracite coal and petroleum coke, all foreign matter being volatilized at a temperature of over 7500° Fahrenheit, the highest temperature used on earth, commercially. Its chief use is in the manufacture of electrodes, lead pencils, and as a powder for dry batteries, paint pigment and lubricants. The Acheson Graphite electrode has largely superseded the ordinary carbon electrode, and replaced the more expensive platinum article, being found to be cheaper and more efficient than the latter, and to have a life from one and one-half to two years compared with the life of from six to eight weeks for the former. For graphite it is claimed that it is a vital agent in increasing the number of electrolytic processes both in the United States and in Europe, because, without it a number of electro-chemical methods would have been rendered impossible. In the recovery of gold, iron, nickel, zinc, tin and copper, it has been very successful, extracting practically 100% of the metal from these ores, at less cost than they were formerly partly refined. It has made caustic soda and bleaching powder both purer and cheaper. By the process of deflocculation, it is made very fine, the particles being so small that it requires 338,704 of them lying side by side to make a lineal inch. Railroads largely use this lubricant, and it is stated that it saves 60% in power. Gredag, which the International Acheson Graphite Company produces, is a ready to use lubricant made in various grades and consistencies for high grade machinery, automobiles, gears, cups, etc. Oildag is deflocculated graphite diffused in the form of rods, tubes and plates for electrothermic, electrolytic and electrical purposes. Unlike all other electrodes, they can be machined, threaded and cut with greatest ease. The company, in 1913, produced 15,969,416 pounds of graphite valued at $1,021,736.

The Spirella Company, Incorporated, manufacturer of corsets, stays and hose supporters, has plants at Niagara Falls, New York, Niagara Falls, Ontario, Meadville, Pennsylvania, where the parent plant is, Letchworth.

Exterior of the Power House of the Canadian Niagara Power Company.

England, and Dusseldorf-Obercassel, Germany. The company has ambitionus plans for an ornamental plant here where it acquired four acres of land on the bank of the Niagara River, in the heart of the City. It has one large, fine building already in operation where it has done its plating, and it has recently arranged to transfer about one-third of its manufacturing business from Meadville to this City. An idea of the magnitude of the company's business may be gained from the fact that over 160,000 pounds of wire were made into stays used in Spirella corsets in the United States during the year 1913. This wire was all fabricated, and made rustproof at the wire and plating works located in Niagara Falls. In factory and field, this business gives employment to over 10,000 people.

At Niagara Falls is located, in the United States Light and Heating Company's establishment, the largest storage battery plant in the world. It is stated that it manufactures the equipment for 75% of all of the electrically lighted trains in the United States, this being accomplished through the axle generator and storage battery, the car being lighted from the latter when not in motion. This plant is also manufacturer of an automobile starter that does away with the fly-wheel entirely, as the armature performs its work. During the year 1913, it manufactured in excess of

10,000 of these electric starting and lighting devices for gasoline automobiles, and over 2000 electric car lighting devices for trains, beside a very large quantity of batteries of various types, sizes and capacities, and for various purposes. The value of its manufactured product for the year was in excess of $3,000,000.

The two big silver plating factories in Niagara Falls, those of William A. Rogers, Limited, and the Oneida Community, in 1913 produced 200,000 gross valued at $3,700,000.

The Niagara Chocolate Company, one of our new industries, has a model plant which it invites all visitors to inspect, and it last year produced 300,000 pounds of chocolate candy. An addition to its plant, and a doubling of its force of employees and business is expected this year.

The Ramapo Iron Works, which has plants at Niagara Falls and Hillburn, Rockland County, New York, manufactures safety switches, automatic safety switch stands and general railroad equipment. The company, in 1913, shipped its products into ten different states to more than twenty different railway lines, making a product valued at $568,000.

The Leather Tire Goods Company, of Niagara Falls, is the largest manufacturer of automobile tire protectors in the world, and controls the patents on what is claimed to be the only practical device. Its product, in 1913, amounted to $200,000, a portion of which was exported.

It has been said that one might as well see Rome without seeing St. Peters, as to see Niagara Falls without seeing "The Home of Shredded Wheat." The Shredded Wheat Company has at Niagara Falls one of the most magnificent factories in the world, erected in the heart of the resident section, and at a cost of over $1,000,000, ideally appointed in every way, and which is annually inspected, including all of the processes of manufacture of shredded wheat biscuit and triscuit, by about 100,000 people from all parts of the world. This company is now completing a second large factory at Niagara Falls, has one at Niagara Falls, Ontario, and is making plans to erect another one at Oakland, California. It uses as high as 3000 bushels of wheat per day, and annually consumes in the neighborhood of 700,000 bushels, much of which is shipped here from the Pacific Coast. Its exact business in 1913 was 1,113,273 cases valued at $3.622,023.23. The new factory at Niagara Falls will considerably increase the output.

One of the latest of the new industries of Niagara Falls is the Lastic Air Company of America. The product is a novel one, and adds another to the more than fifty kinds of manufacturing in this City. In a very few years automobile manufacturing has become one of the greatest industries in this country. The automobile has come into general use, and it is estimated that there are 1,000,000 cars now in operation in the United States. One great concern makes over one hundred cars per hour, or about one thousand in ten hours. The greatest problem of automobile manufacturers has been tire trouble. The Lastic Air Company of America claims to have solved it.

View of the Rapids Looking Up the River From the American Falls, and Showing Part of the Goat Island Bridge.

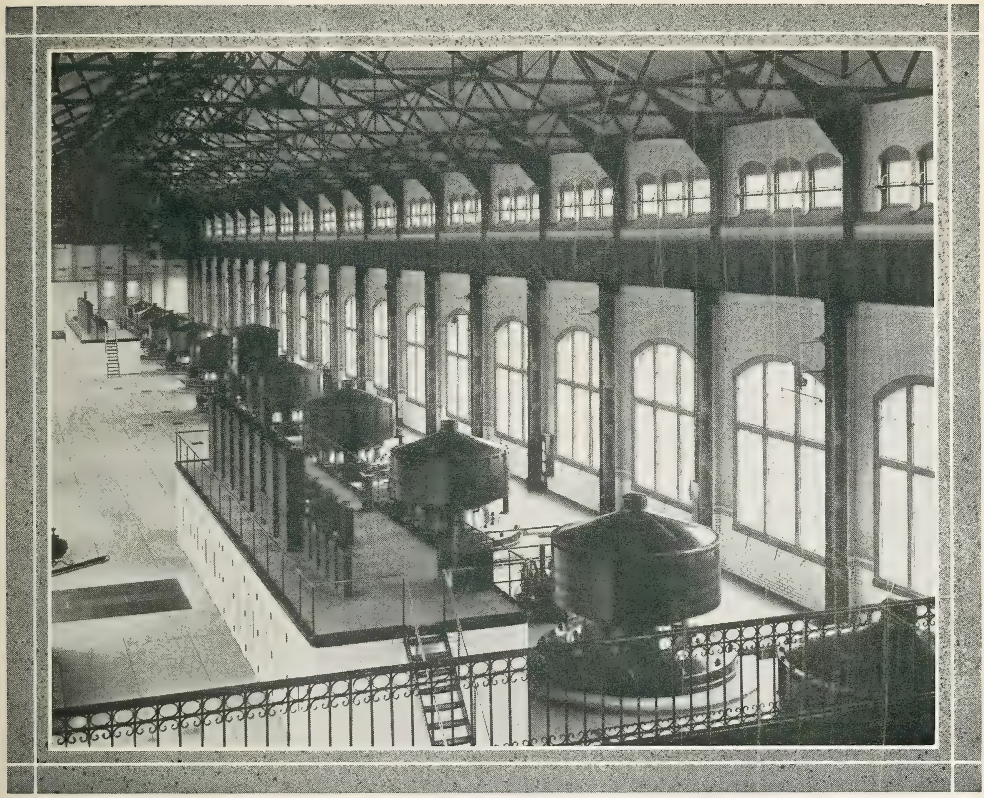
In March, 1913, the Lastic Air Company came from Canada and located in this City. In August, of that year, it changed its name to the Lastic Air Company of America. O. M. Mackie, the inventor, became sole owner of the new concern. This company manufactures a product from corn oil under a secret process. This product is used in place of air in automobile tires. It is three years since lastic air was first marketed in Canada. One of the company's oldest agencies is in Montreal, Quebec, at 1332 St. Lawrence Boulevard, under the management of F. Michaud. Mr. Michaud has retained an expensive store for about three years, selling lastic air. This fact goes to show that he has met with success, or he would not continue the large expense which he is under. Each year his business is increasing. Since the Lastic Air Company of America located in Niagara Falls, it has opened five additional factories in different portions of the United States. In addition to these factories, it has numerous agents who sell lastic air in the United States and Canada. Arrangements are now under way to commence a chain of factories throughout the European countries.

The Lastic Air Company secures, as its representatives, men of standing, such as bankers and others who are high up in financial circles. Hence the car owners are assured of high class service. For many years automobile owners have tried to solve the problem of tire troubles. The Lastic Air Company of America has overcome the dreaded tire troubles. Its growth and prosperity shows the interest the automobile owners have taken in this great invention. Lastic air is practically a petrified oil which is not affected by heat or cold. Its use prevents punctures, blow-outs, slow leaks and rim cuts. In addition, it doubles the mileage of tires. A large truck which hauled heavy loads of ice for over a year, is running at the Canadian Falls, and is a source of interest for tourists, as automobile owners can hardly realize how lastic air stands up under the terrible strain.

This company also manufactures a cushion insole for shoes made from the same lastic air. Lastic air is a chemical compound which has exactly the same resiliency as air. The compound is molded to fit the different sized casings. This scientific compound is unaffected by heat or cold. When placed in casings, it does not harden, crumble, flatten, deteriorate or go out of shape, no matter what strain is placed on the tires.

The movement now well under way in the United States, Great Britain and Canada to appropriately celebrate the hundredth anniversary of peace between English speaking peoples, is of absorbing interest to the people of the Niagara Frontier where was staged many of the important actions of the last war between the United States and Great Britain. Added emphasis has just been given to this interest by the meeting at Niagara Falls, Ontario, of the mediators appointed to consider the Mexican situation. Within sight and sound of the world's greatest cataracts, the A. B. C. envoys and the American and Mexican Commissioners had the eyes of the civilized world upon them while negotiating in the interest of that universal peace which now appeals so strongly to all thinking people. Toward this very desirable end, much has been accomplished by treaty upon the initiative of the United States in the past few months. It has been well said that happy are the people who find wisdom, and the nations that get understanding of one another; for out of understanding comes friendship, and out of friendship comes peace.

It is interesting to note, here, in connection with the conference of the mediators at Niagara Falls to deal with the Mexican question, that Andrew B. Humphrey, Secretary of the American Peace Committee, said at the Lake Mohonk Conference in 1911, that "It is significant that the signing of the treaty of Ghent on Christmas Eve, 1814, was not brought about by the commissioners, for, after they had been in conference for pretty nearly six months, the two nations, themselves, forced by a strong public sentiment among the people of both countries demanding peace, directed the commissioners to conclude a peace pact regardless of the claims set forth by the commissioners and their representative governments. Thus the Ghent treaty was concluded without reference to the matters which brought on the war. The treaty was forced by public sentiment, and is a monument to that greater force than war—irresistible public opinion."



Interior of Power House No. 1 of the Niagara Falls Power Company.

The plan to celebrate the centenary of the signing of the Treaty of Ghent, which established lasting peace between America and Great Britain, as well as the plan to signalize, in fitting manner, the peace which has existed between the United States, Great Britain and other nations, is of especial interest to the Niagara Frontier because this region was the chief theatre of the war of 1812-14, and is the only section where the fighting was practically continuous. One hundred years ago bloody battles were fought on the Canadian Side of the Niagara River, at Fort Erie, Chippawa, Lundy's Lane and Queenston, between contending armies speaking the same tongue.

The war was declared by the President between the United States and Great Britain, June 19th, 1812. In the order of their location, coming down the river from Lake Erie, and their mention above, rather than priority of date, the battle of Lake Erie was fought September 17th, 1814. It was a sortie, and afterward Sir William Napier wrote that "It is the only instance in history of a besieging army being absolutely routed in a single sortie." This sortie was planned and led by General Peter B. Porter of Niagara Falls. The one hundred years peace anniversary is also of particular interest because General Porter, a resident of the Niagara Frontier, was commander of the American forces in this section in the war of 1812. General Porter was also

Secretary of State of the State of New York, representative in Congress for this district, Secretary of War in the Cabinet of President John Quincy Adams, and a member of the American Boundary Commission of 1819. His son, Colonel Peter A. Porter, led a regiment to the Civil War from the Niagara Frontier, and was killed at Cold Harbor, Virginia, while his grandson, Honorable Peter A. Porter, as a member of the State Legislature, secured the franchises for the Niagara Falls Power Company which inaugurated the era of electrical power, was a representative in Congress, like his grandfather, is the historian of the Niagara Frontier, and is now chairman of the Niagara Falls One Hundred Years Peace Committee.

The Battle of Chippawa was fought within sight of the Falls of Niagara, July 5th, 1814. Batteries were located on both sides of the mouth of Chippawa Creek during the war of 1812.

On July 25th, 1814, at another picturesque spot, in sight and sound of the great cataracts, in fact on the highest point of land in this section, was fought the Battle of Lundy's Lane. The setting was particularly spectacular in view of the fact that the battle was commenced late in the afternoon and continued until midnight by moonlight. This battle is also especially distinguished by the fact that both armies claim to have won it, and it is said to have been the only battle in history, which both sides claim to have won. That situation obtains even to this day, and until recent years, the Canadians annually celebrated the alleged victory of British arms. The era of good feeling between the Americans and British really had its inception at Niagara Falls, New York, on May 1st, 1898, when the 42nd Separate Company, of Niagara Falls, New York, a part of the New York State Militia, marched away to take part in the Spanish-American War, the British came over from Niagara Falls, Ontario, and walked side by side with the American soldiers, while the Stars and Stripes and Union Jack floated together in the sunlight. This was on the same date as Admiral Dewey's famous victory at Manila Bay.

On October 12th, 1812, another battle was fought, at Queenston Heights, which the British won, but at which the British Commander, General Brock, was killed. Upon the escarpment above the battle field, where it can be seen for many miles around, stands a noble monument erected to the memory of General Brock. From its top is obtained one of the most magnificent views to be found in all America, covering the Niagara Peninsula, the Niagara River and Lake Ontario. Upon the spot where General Brock fell, is a cenotaph suitably inscribed.

At the mouth of the Niagara River, on the Canadian side, was Fort George. The extensive earth works are still discernible. The construction of the Fort was commenced in 1796, and it was enlarged prior to the war of 1812, and was the military center of that region during the war one hundred years ago. Farther up the river is Fort Mississaga consisting of a stone block house and high earth works, which was built by the British in 1814, and its guns covered Fort Niagara on the American side of the river.

View of the American Rapids Farther Up the River Looking Toward the American Falls and Showing the Old Goat Island Bridge.

Still another historic point of interest in that section, is Navy Hall which was the residence of Governor Simcoe, the first Governor-General of Upper Canada.

On the New York side, at the mouth of the Niagara River, is one of the most historic spots upon this continent. Within the walls of old Fort Niagara, there are relics of two and one-half centuries. The United States Government has a reservation there of 188 acres, and maintains a portion of the army there at all times in the modern buildings, but at the extreme point where the Niagara River enters Lake Ontario, are the structures of the ancient fort. Honorable Peter A. Porter, the historian of the Niagara Frontier, tells us that in 1669, Father LaSalle, the French explorer who constructed at the village bearing his name, just south of the City of Niagara Falls, the Griffon, the first vessel to sail the upper lakes, built the first structure other than an Indian wigwam, ever erected on the Niagara Frontier. Again in 1678, the year that Father Hennepin, LaSalle's associate explorer, saw Niagara Falls, the first white man to gaze upon the mighty cataracts, LaSalle built there, Fort Conti. That fort was destroyed, and in 1687 DeNonville built another fort called after himself. That fort was destroyed by the Seneca Indians the next year. The French, in 1725, erected a stone structure, the foundations of which remain, and are credited with being the oldest existing masonry west of Albany. The French enlarged the fort, but were supplanted by the British in 1759. Mr. Porter says that Fort Niagara was the center of the history of the middle part of North America for over one hundred years, and during the 18th century, its commandant, whether English or French, was the most important man west of New York. In 1770

View of the American Rapids Looking Down the River and Showing New Goat Island Bridge and Canadian Side.

Major Wynne reported that "Niagara is, without exception, the most important post in America, and secures a greater number of communications, through a more extensive country, than perhaps any other pass in the world." Mr. Porter adds that "No one spot of land in North America has played a more important part in the control, growth and settlement of the Great West than the few acres embraced within its fortifications. Its cemetery is the oldest consecrated ground west of Albany." The French rule ended there in 1759. Of course, the British occupation ended there at the close of the war of 1812. Old Fort Niagara has been under three flags, the French, British and American, and the Indians had much to do with that region.

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